

WHAT IS CLAIMED IS:

1. A method of detecting a transmission unit fault condition, comprising:
 - performing a first datapath ingress transmission unit counting operation during a first duration consisting of a first specified counting interval and a first specified settling interval after the first specified counting interval elapses at a first counter of a first transmission unit counter set in a datapath, wherein a first datapath ingress transmission unit count is determined;
 - performing a first datapath egress transmission unit counting operation during the first specified counting interval and during the first duration at a first counter of a second transmission unit counter set in the datapath, wherein a first datapath egress transmission unit count is determined;
 - and
 - indicating a fault condition associated with the first specified counting interval when a difference is determined between the first datapath ingress transmission unit count and the first datapath egress transmission unit count after the first specified settling interval elapses.

2. The method of claim 1 wherein the first specified counting interval and the first specified settling interval are each respective prescribed intervals of time.
3. The method of claim 1 wherein the first specified settling interval is dependent upon a propagation delay through the datapath between the first counter of the first transmission unit counter set and the first counter of the second transmission unit counter set.
4. The method of claim 1, further comprising:
inserting a first trigger transmission unit upstream of the first transmission unit counter set for activating the first counter of the first transmission unit counter set and the first counter of the second transmission unit counter set during the first specified counting interval; and
confirming that the first trigger transmission unit is received by the first transmission unit counter set and by the second transmission unit counter set prior to indicating the fault condition associated with the first specified counting interval.
5. The method of claim 4, further comprising:
adjusting a counter indicator associated with the first transmission unit counter set to a state indicating the first counter of the first transmission unit counter set is active in response to the first trigger transmission unit being received by the first transmission unit counter set;
adjusting a counter indicator associated with the second transmission unit counter set to a state indicating the first counter of the second transmission unit counter set is active in response to the first trigger transmission unit being received by the second transmission unit counter set; and

wherein confirming includes checking the states of the counter indicator associated with the first transmission unit counter set and the counter indicator associated with the second transmission unit counter set prior to indicating the fault condition associated with the first specified counting interval.

6. The method of claim 1, further comprising:
inserting a first trigger transmission unit upstream of the first transmission unit counter set for activating the first counter of the first transmission unit counter set and the first counter of the second transmission unit counter set during the first specified counting interval
inserting a second trigger transmission unit upstream of the first transmission unit counter set for activating a second counter of the first transmission unit counter set and a second counter of the second transmission unit counter set during a second specified counting interval following the first specified counting interval; and
confirming that the second trigger transmission unit is received by the first transmission unit counter set and by the second transmission unit counter set prior to indicating the fault condition associated with the first specified counting interval.

7. The method of claim 1 wherein indicating the fault condition is performed after confirming that a first trigger transmission unit has been received by the first transmission unit counter set and by the second transmission unit counter set.
8. The method of claim 1 wherein indicating the fault condition is performed after confirming that a second trigger transmission unit, transmission of which occurs after transmission of a first trigger

transmission unit, has been received by the first transmission unit counter set and by the second transmission unit counter set.

9. The method of claim 1 wherein:

performing the first datapath ingress transmission unit counting operation includes tagging transmission units received at a first transmission unit designating location during the first specified counting interval as first designated transmission units and counting said first designated transmission units received at the first counter of the first transmission unit counter set; and

performing the first datapath egress transmission unit counting operation includes counting said first designated transmission units received at the first counter of the second transmission unit counter set during the first specified counting interval and during the first specified settling interval.

10. The method of claim 9 wherein tagging said transmission units includes setting at least one bit of each said transmission units to a first prescribed setting.
11. The method of claim 10 wherein said at least one bit is located similarly within each one of said transmission units.
12. The method of claim 1 wherein indicating the fault condition associated with the first specified counting interval includes comparing the first datapath ingress transmission unit count with the first datapath egress transmission unit count for determining the difference therebetween.
13. The method of claim 1, further comprising:
 - initiating a second specified counting interval after the first specified counting interval elapses;
 - performing a second datapath ingress transmission unit counting operation, of transmission units designated during the second specified counting interval, at a second counter of the first transmission unit counter set in the datapath, wherein a second datapath ingress transmission unit count is determined;
 - performing a second datapath egress transmission unit counting operation, during a second duration consisting of the second specified counting interval and a second specified settling interval after the second specified counting interval elapses, at a second counter of the second transmission unit counter set in the datapath, wherein a second datapath egress transmission unit count is determined; and
 - indicating a fault condition associated with the second specified counting interval when a difference is determined between the second datapath ingress transmission unit count and the second datapath egress

transmission unit count after the second specified settling interval elapses.

14. The method of claim 1 wherein at least one datapath unit is coupled between the first transmission unit counter set and the second transmission unit counter set.

15. The method of claim 1, further comprising:
performing a first datapath intermediary transmission unit counting operation during the first duration at a first counter of a third transmission unit counter set in the datapath, wherein a first datapath intermediary transmission unit count is determined, the third transmission unit counter set being situated between the first transmission unit counter set and the second transmission unit counter set along the datapath.

16. The method of claim 15 wherein indicating a fault condition further comprises:

comparing the first datapath intermediary transmission unit count to the first datapath ingress transmission unit count to identify a first fault status pertaining to a first portion of the datapath between the first transmission unit counter set and the third transmission unit counter set; and

comparing the first datapath egress transmission unit count to the first datapath intermediary transmission unit count to identify a second fault status pertaining to a second portion of the datapath between the third transmission unit counter set and the second transmission unit counter set.

17. The method of claim 1, further comprising:
performing a first datapath second egress transmission unit counting operation
during the first duration at a first counter of a third transmission unit
counter set in the datapath, wherein a first datapath second egress
transmission unit count is determined, the third transmission unit
counter set being situated along a path branching from the datapath
between the first transmission unit counter set and the second
transmission unit counter set.
18. The method of claim 17 wherein identical transmission units are
provided to the second transmission unit counter set and the third
transmission unit counter set and wherein indicating a fault
condition associated with the first specified counting interval
alternatively occurs when a difference is determined between the
first datapath ingress transmission unit count and the first datapath
second egress transmission unit count after the first specified
settling interval elapses.
19. The method of claim 1 wherein performing a first datapath egress
transmission unit counting operation is further performed at a first
counter of a third transmission unit counter set, the third
transmission unit counter set being situated along a path branching
from the datapath between the first transmission unit counter set
and the second transmission unit counter set, wherein the first
datapath egress transmission unit count is further determined
according to a sum of a first portion of transmission units counted
at the first transmission unit counter set and a second portion of
transmission units counted at the third transmission unit counter
set.

20. A method of detecting a transmission unit fault condition, comprising:
performing a first transmission unit counting process for determining a first datapath ingress transmission unit count and a first datapath egress transmission unit count of a datapath, wherein the first datapath ingress transmission unit count is facilitated by a first transmission unit counter of each of a plurality of ingress transmission unit counter sets while processing first transmission units so designated during a first duration consisting of the first specified counting interval and a first specified settling interval after the first specified counting interval elapses, and the first datapath egress transmission unit count is facilitated by a first transmission unit counter of an egress transmission unit counter set during the first duration; and
indicating a fault condition associated with the first specified counting interval when a difference is determined between the first datapath ingress transmission unit count and the first datapath egress transmission unit count after the first specified settling interval elapses.

21. The method of claim 20 wherein determining the first datapath ingress transmission unit count includes summing an ingress transmission unit count facilitated by the first transmission unit counter of each one of said ingress transmission unit counter sets.

22. The method of claim 20 further comprising:
inserting a respective first trigger transmission unit upstream of the first counter of each one of said ingress transmission unit counter sets during the first specified counting interval for activating the first counter of each one of said ingress transmission unit counter sets and the first counter of the egress transmission unit counter set; and

confirming that the respective first trigger transmission unit inserted upstream of the first counter of each one of said ingress transmission unit counter sets is received by the first counter of each one of said ingress transmission unit counter sets and by the first counter of the egress transmission unit counter set prior to indicating the fault condition associated with the first specified counting interval.

23. The method of claim 22, further comprising:

adjusting a counter indicator associated with each one of said ingress transmission unit counter sets to a respective state indicating the first counter of each one of said ingress transmission unit counter sets is active in response to the respective first trigger transmission unit being received by the first counter of a respective one of said ingress transmission unit counter sets;

adjusting a counter indicator associated with the egress transmission unit counter set to a state indicating the first counter of the egress transmission unit counter set is active in response to the first trigger transmission unit being received by the first counter of the egress transmission unit counter set; and

wherein confirming includes verifying that the counter indicator associated with each one of said ingress transmission unit counter sets and the counter indicator associated with the egress transmission unit counter set indicate respective active states prior to indicating the fault condition associated with the first specified counting interval.

24. The method of claim 20 further comprising:

inserting a respective first trigger transmission unit upstream of the first counter of each one of said ingress transmission unit counter sets during the first specified counting interval for activating the first

counter of each one of said ingress transmission unit counter sets and the first counter of the egress transmission unit counter set; inserting a respective second trigger transmission unit upstream of the first counter of each one of said ingress transmission unit counter sets during the first specified counting interval for activating a second counter of each one of said ingress transmission unit counter sets and a second counter of the egress transmission unit counter set; and confirming that the respective second trigger transmission unit inserted upstream of the first counter of each one of said ingress transmission unit counter sets is received by each one of said ingress transmission unit counter sets and by the egress transmission unit counter set prior to indicating the fault condition associated with the first specified counting interval.

25. The method of claim 20 wherein indicating the fault condition associated with the first specified counting interval is performed after confirming that a respective first trigger transmission unit has been received by the first counter of each one of said ingress transmission unit counter sets and by the first counter of the egress transmission unit counter set.

26. The method of claim 20 wherein performing the first transmission unit counting process includes:

tagging transmission units at a first designating location during the first specified counting interval as first designated transmission units to be received by at least one of said ingress transmission unit counting sets; counting said first designated transmission units received at said ingress transmission unit counting sets; and counting said first designated transmission units received at the egress transmission unit counter set during the first duration.

27. The method of claim 26 wherein tagging of said transmission units includes setting at least one bit of each said transmission units to a first prescribed setting.
28. The method of claim 27 wherein said at least one bit is located similarly within each one of said transmission units.
29. The method of claim 20 wherein indicating a fault condition includes comparing the first datapath ingress transmission unit count with the first datapath egress transmission unit count for determining the difference associated with the first specified counting interval.
30. The method of claim 20, further comprising:
initiating a second specified counting interval after the first specified counting interval elapses;
performing a second transmission unit counting process for determining a second datapath ingress transmission unit count and a second datapath egress transmission unit count, wherein the second datapath ingress transmission unit count is facilitated by a second transmission unit counter of said ingress transmission unit counter sets while processing second transmission units so designated during the second specified counting interval and the second datapath egress transmission unit count is facilitated, during a second duration consisting of a second specified counting interval and a second specified settling interval after the second specified counting interval elapses, by a second transmission unit counter of the egress transmission unit counter set;
and
indicating a fault condition associated with the second specified counting interval when a difference is determined between the second datapath

ingress transmission unit count and the second datapath egress transmission unit count after the second specified settling interval elapses.

31. The method of claim 20 wherein at least one datapath unit is coupled between the ingress transmission unit counter sets and the egress transmission unit counter set.

32. A method of detecting a transmission unit fault condition, comprising:

designating transmission units received at a designating location of a datapath during a first specified counting interval as first designated transmission units;

determining a first datapath ingress transmission unit count for said designated transmission units at a first counting location during a first duration consisting of the first specified counting interval and a first specified settling interval after the first specified counting interval elapses, wherein determining the first datapath ingress transmission unit count is facilitated by a first counter of a transmission unit counter set at the first counting location;

determining a first datapath egress transmission unit count for said designated transmission units at a second counting location of the datapath during the first duration wherein determining the first datapath egress transmission unit count is facilitated by a first counter of a transmission unit counter set at the second counting location; and

indicating a transmission unit fault condition associated with the first specified counting interval when a difference is determined between the first datapath ingress transmission unit count and the first datapath egress transmission unit count after the first specified settling interval elapses.

33. The method of claim 32, further comprising:

inserting a first trigger transmission unit upstream of said first transmission unit counter set for activating the first counter of the transmission unit counter set at the first counting location and the first counter of the transmission unit counter set at the second counting location; and confirming that the first trigger transmission unit is received by the first counter of the transmission unit counter set at the first counting

location and the first counter of the transmission unit counter set at the second counting location prior to indicating the fault condition associated with the first specified counting interval.

34. The method of claim 33, further comprising:
 - adjusting a counter indicator associated with the transmission unit counter set at the first counting location to a state indicating the first counter of the transmission unit counter set at the first counting location being active in response to the first trigger transmission unit being received by the first counter of the transmission unit counter set at the first counting location;
 - adjusting a counter indicator associated with the transmission unit counter set at the second counting location to a state indicating the first counter of the transmission unit counter set at the second counting location being active in response to the first trigger transmission unit being received by the first counter of the transmission unit counter set at the second counting location; and
- wherein confirming includes checking the states of the counter indicator associated with the transmission unit counter set at the first counting location and the counter indicator associated with the transmission unit counter set at the second counting location prior to indicating the fault condition associated with the first specified counting interval.

35. The method of claim 33 wherein indicating the fault condition associated with the first specified counting interval is performed after confirming that a second trigger transmission unit has been received by the first counter of the first transmission unit counter set and by the first counter of the second transmission unit counter set.

36. The method of claim 32 wherein:
designating said transmission units includes tagging said transmission units as being first designated transmission units when received at the designating location during the first specified counting interval;
determining the first datapath ingress transmission unit count includes counting said first designated transmission units received at the first counter of the transmission unit counting set at the first counting location during the first duration; and
determining the first datapath egress transmission unit count includes counting said first designated transmission units received at the first counter of the transmission unit counter set at the second counting location during the first duration.

37. The method of claim 36 wherein tagging said transmission units includes setting at least one bit of each said transmission units to a first prescribed setting.
38. The method of claim 37 wherein said at least one bit is located similarly within each one of said transmission units.
39. The method of claim 32, further comprising:
 - designating transmission units entering the designating location of the datapath during a second specified counting interval as second designated transmission units;
 - determining a second datapath ingress transmission unit count for said second designated transmission units received at the first counting location during a second duration consisting of the second specified counting interval after the first specified counting interval elapses and a second specified settling interval after the second specified counting interval elapses, wherein determining the second datapath ingress transmission unit count is facilitated by a second counter of the transmission unit counter set at the first counting location;
 - determining a second datapath egress transmission unit count for said second designated transmission units received at the second counting location of the datapath adjacent to the first counting location during the second duration, wherein determining the second datapath egress transmission unit count is facilitated by a second counter of the transmission unit counter set at the second counting location; and
 - indicating a transmission unit fault condition associated with the second specified counting interval when a difference is determined between the second datapath ingress transmission unit count and the second datapath egress transmission unit count after the second specified settling interval elapses.

40. The method of claim 32 wherein at least one datapath unit is coupled between the transmission unit counter set at the first counting location and the transmission unit counter set at the second counting location.
41. The method of claim 32, wherein determining the first datapath ingress transmission unit count is further performed at a third counting location and is further facilitated by a first counter of a transmission unit counter set at the third counting location.
42. The method of claim 32, wherein determining the first datapath egress transmission unit count is further performed at a third counting location and is further facilitated by a first counter of a transmission unit counter set at the third counting location.

43. A network system, comprising:

a first transmission unit counter set including a first plurality of counters,
wherein the first transmission unit counter set is coupled in a datapath
at a first counting location of the datapath and is capable of facilitating
a datapath ingress transmission unit count;
a second transmission unit counter set including a second plurality of
counters, wherein the second transmission unit counter set is coupled
in the datapath at a second counting location of the datapath and is
capable of facilitating a datapath egress transmission unit count; and
a first datapath unit coupled in the datapath between the first transmission unit
counter set and the second transmission unit counter set

44. The network system of claim 43 further comprising:

a counter activation module coupled in the datapath for activating a first
counter of the first plurality of counters and for subsequently
activating a second counter of the first plurality of counters.

45. The network system of claim 44 wherein the counter activation module activates the first counter of the first plurality of counters to count a first group of transmission units passing the counter activation module along the datapath during a first period of time.
46. The network system of claim 45 wherein the counter activation module activates the first counter of the first plurality of counters to count a second group of the transmission units passing the counter activation module along the datapath during a second period of time.
47. The network system of claim 46 wherein the counter activation module activates the first counter of the first plurality of counters by tagging the first group of the transmission units.
48. The network system of claim 46 wherein the counter activation module activates the first counter of the first plurality of counters by inserting a trigger transmission unit among the transmission units.

49. A network system, comprising;

means for performing a first datapath ingress transmission unit counting operation, during a duration consisting of a first specified counting interval and a first specified settling interval after the first specified counting interval elapses, at a first counter of a first transmission unit counter set in a datapath, wherein a first datapath ingress transmission unit count is determined;

means for performing a first datapath egress transmission unit counting operation during the duration at a first counter of a second transmission unit counter set in the datapath , wherein a first datapath egress transmission unit count is determined; and

means for indicating a fault condition associated with the first specified counting interval when a difference is determined between the first datapath ingress transmission unit count and the first datapath egress transmission unit count after the first specified settling interval elapses.